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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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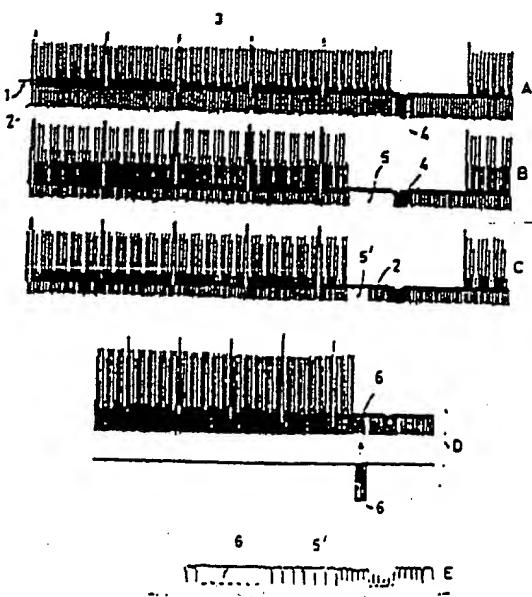
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(54) Title: A METHOD AND AN APPARATUS FOR PREVENTING UNAUTHORIZED COPYING OF VIDEO SIGNALS ON TAPE

## (57) Abstract

A method and an apparatus for modifying video signals in such a manner that, when recording said signals with a tape recording apparatus, the control of this apparatus is disturbed, which signals comprise image point signals grouped according to image lines and preceded, in each line, by a line synchronization pulse and a colour synchronization signal, the plurality of lines being combined to a frame preceded by a frame synchronization pulse, the image point signals being situated at one side, and the synchronization pulses at the other side of a zero level, in which additional pulses resembling line synchronization pulses having a deviating shape or situated in deviating points of a frame are added. In particular, in at least a part of the frames, in a number of last lines, the normal line synchronization pulses are removed in arbitrary locations, and, instead thereof, additional pulses with a deviating shape, and in particular a shorter duration, are introduced.



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A method and an apparatus for preventing unauthorized copying of video signals on tape.

In order to counteract unauthorized recording of video programmes legitimately recorded on tape or transmitted via television channels, it has already been proposed to modify the video signal series in such a manner that this is not perceptible in a reproducing apparatus, but that the control of an apparatus used for illegally recording these signals is sufficiently disturbed for making the recording unusable.

5 There is still a need for such an improvement of such methods that such disturbances cannot be removed by means of

10 so-called time-base correctors.

The invention relates to a method for this purpose, according to which the video signals are of the kind mentioned in the preamble of claim 1, in which, according to the invention, additional pulses resembling line synchronization pulses with a deviating shape or in deviating points of a

15 frame are added.

The additional pulses have the consequence that, in a recording apparatus, the amplification thereof is influenced in such a manner that the zero level in the subsequent part

20 shifts towards the side of the synchronization pulses. In the case of claims 2 and 3 the recognizability of the subsequent frame synchronization pulses is reduced or removed, whereas, in the case of claims 4..6, the subsequent image point signals

will be suppressed or attenuated. In both cases the quality of the recorded image will be disturbed in such a manner that such a recording will become unsaleable. Since, in both cases, the location of the additional pulses in the frame can be 5 continually varied, it becomes virtually impossible to remove said disturbance.

The control circuits of a reproducing apparatus will not be influenced by these additional pulses, so that a tape with only modified signals remains as such suitable for normal 10 reproduction.

The invention will be elucidated below in more detail by reference to a drawing, showing in:

Figs. 1A..E video signal oscilloscopes for elucidating a first embodiment of the invention;

15 Fig. 2 a corresponding oscilloscope, from which appears the disturbance occurring when unauthorizedly recording on tape video signals modified according to the invention; and

Figs. 3A..C oscilloscopes of an image line for elucidating a second embodiment of the invention.

20 In Fig. 1A the end of an image frame of a normal television image signal is shown. This comprises line synchronization pulses 2 situated below a zero line 1, image line signals 3 above this zero line, and a frame synchronization pulse signal 4 at the beginning of the next 25 frame and also situated below the line 1.

According to the invention, and as indicated at 5 in Fig. 1B, initially a number of image lines 3, e.g. 10..20 lines, with the corresponding line synchronization pulses 2 is removed. These lines lie, at any rate, already outside the 30 normal image frame, and can be done without therefore as such.

Subsequently, e.g. in the manner of Fig. 1C, in the interspace 5 thus obtained the original line synchronization pulses 2 are provided in specific points, and an interspace 5' will then remain.

35 In Fig. 1D is shown that the interspace 5' of Fig. 1C is filled with additional pulses 6, and Fig. 1E shows, at a

different time scale, that these pulses have a deviating shape, i.e. are shorter than the normal pulses 2.

These deviating pulses 6 have the consequence, that, when recording the signals in a tape recording apparatus, the 5 control is disturbed. The oscillogram reproduced in Fig. 2 shows at 7 that, as a consequence of the deviating pulses, the zero level 1 is shifted towards the negative side, so that the synchronization circuit of the recording apparatus will not or 10 badly recognize them as synchronization pulses, so that the frame synchronization is disturbed. The image quality becomes so bad that such tape recordings will be unsaleable.

This disturbing effect can be amplified by changing the location of the additional pulses 6, and then also more than one interspace 5' can be formed. This needs not to take place 15 in each frame. In this manner a completely random disturbance can be obtained, so that the effect will be amplified still more, and suppression of the disturbance will be made virtually impossible.

A still further disturbance of video signals un-  
20 authorizedly recorded on tape can be obtained in the manner of Fig. 3. In Fig. 3A a normal line portion 3 of the signal of Fig. 1A is reproduced. This comprises a line synchronization pulse 2, a colour synchronization signal 8, and image signals 9, which, here, represent a grey wedge or the like.

25 According to the invention, as shown in Fig. 3B, after the colour synchronization signal 8 an additional pulse 6' is added, of which the length and location can vary. When recording such a signal with a tape recording apparatus, this additional pulse causes again the amplification control 1 to 30 be affected, so that a portion of the subsequent image point signals 9 will be attenuated, which provides an additional deterioration of the image quality. Also this disturbance can be provided in arbitrary lines and/or frames.

An amplification of the effect can be obtained in the 35 manner of Fig. 3C, in which the additional pulse 6' at its end is continued by an oppositely directed pulse 6".

Those above-mentioned disturbance manners can be used independently from one another, but provide, together, an optimal safety against unauthorizedly recording video signals on tape. The additional signals have no influence on 5 the control circuits of an image reproducing apparatus having a synchronization which is simpler than that of the recording head of a tape recording apparatus. Circuits for executing the method according to the invention can be executed in different ways, and comprise mixing stages in which the additional 10 pulses, which are generated synchronously with the pulses 2 of the video signal, are mixed in the envisaged points with the video signal according to a, in particular variable, program, or according to a random function.

## C L A I M S

1. A method for modifying video signals in such a manner that, when recording said signals with a tape recording apparatus, the control of this apparatus is disturbed, which signals comprise image point signals grouped according to image lines and preceded, in each line, by a line synchronization pulse and a colour synchronization signal, the plurality of lines being combined to a frame preceded by a frame synchronization pulse, the image point signals being situated at one side, and the synchronization pulses at the other side of a zero level, characterized in that additional pulses resembling line synchronization pulses having a deviating shape or situated in deviating points of a frame are added.

2. The method of claim 1, characterized in that, at least in a part of the frames, in a number of last lines the normal line synchronization pulses are removed in arbitrary locations, and in that, instead thereof, additional pulses with a deviating shape, and in particular a shorter duration, are introduced.

3. The method of claim 2, characterized in that the points of introduction of additional pulses differ in the different frames.

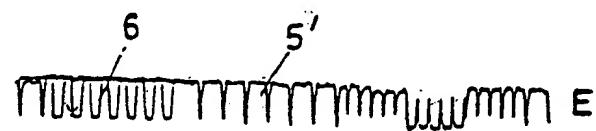
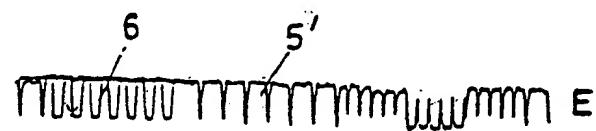
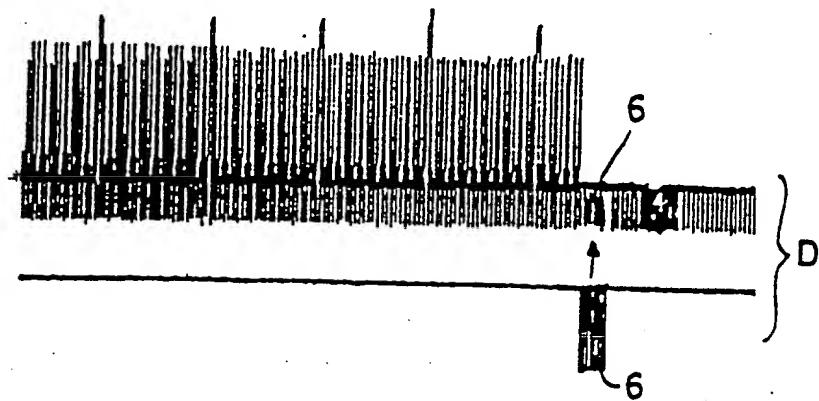
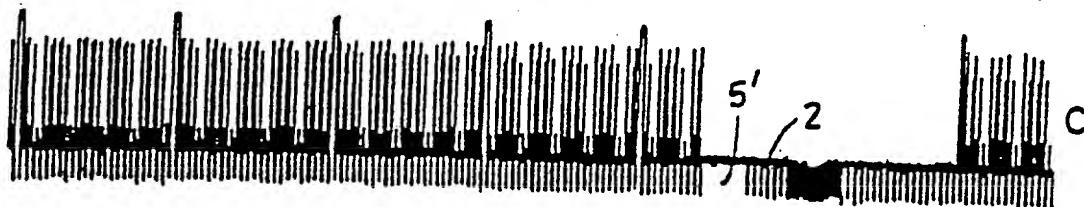
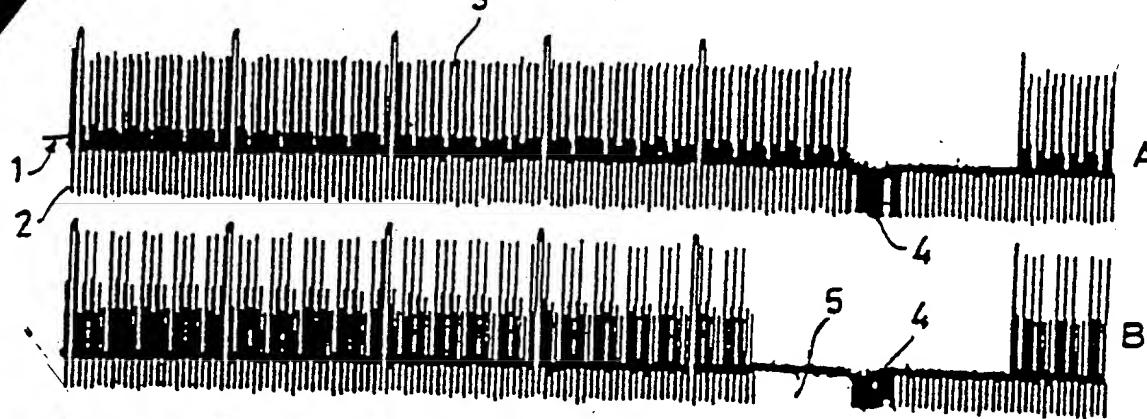
4. The method of claim 3, characterized in that, in at least a part of the lines of a frame and between the colour synchronization signal and the image point signals, an additional pulse having the same sense as the line synchronization pulses is added.

5. The method of claim 4, characterized in that the location and/or the duration of the additional pulses are slowly varied.

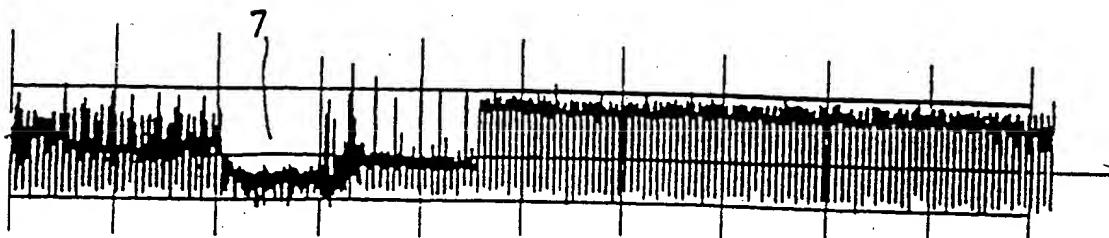
6. The method of claim 4 or 5, characterized in that the additional pulses are continued with a pulse having the opposite sense beyond the zero level line.

7. An apparatus for executing the method of any one of claims 1..6, characterized by means for adding additional pulses to the image frames.

1/2



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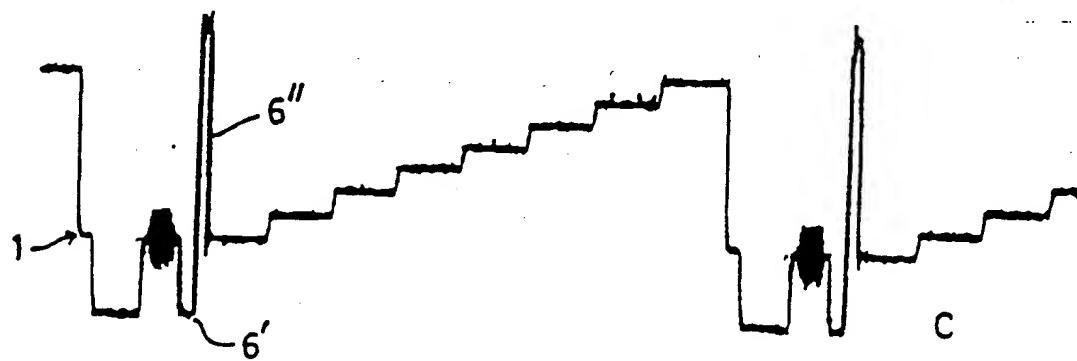
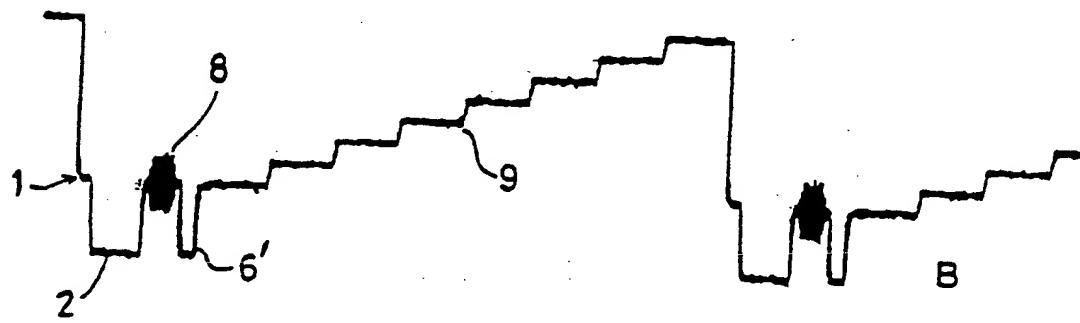
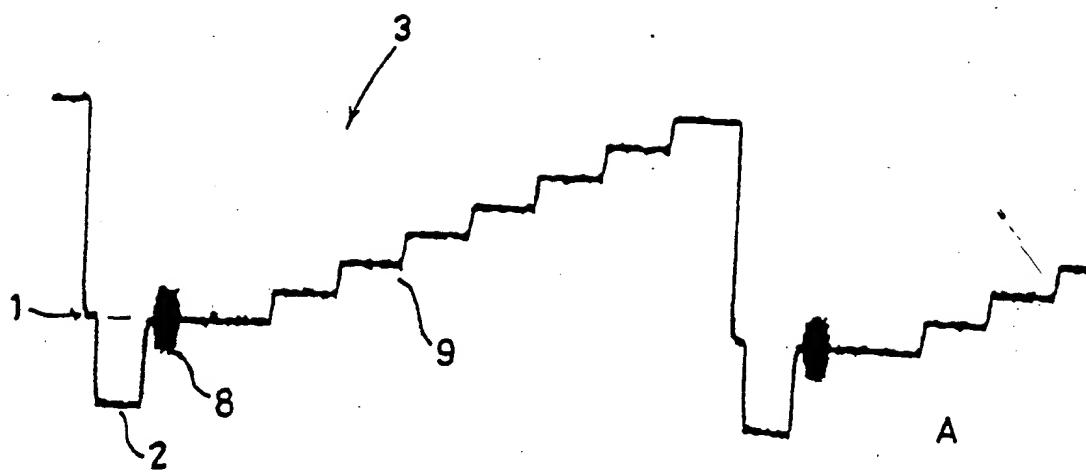


FIG: 5.

## INTERNATIONAL SEARCH REPORT

International Application No. PCT/EP 91/00738

## I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC<sup>5</sup>: H 04 N 5/91

## II. FIELDS SEARCHED

Minimum Documentation Searched ?

Classification System	Classification Symbols
IPC <sup>5</sup>	H 04 N

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## III. DOCUMENTS CONSIDERED TO BE RELEVANT\*

Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. 13
X	EP, A, 0364047 (COPYGUARD ENTERPRISES S.A.) 18 April 1990 see column 4, lines 4-21; column 5, lines 39-46	1,7
A	---	3,4
X	EP, A, 0199553 (J. RYAN) 29 October 1986 see column 5, line 5 - column 14, line 29	1,7
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X	US, A, 4888649 (M. KAGOTA) 19 December 1989 see column 2, lines 30-68	1,7
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A	---	2,4,6

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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

10th June 1991

Date of Mailing of this International Search Report

01.08.91

International Searching Authority

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Signature of Authorized Officer

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## III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

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ANNEX TO THE INTERNATIONAL SEARCH REPORT  
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GB-A- 1571386	16-07-80	None	